Paper presented at the 22nd Asian Conference on Remote Sensing, 5 - 9 November 2001, Singapore.

CREATION OF SPATIAL INFORMATION DATABASE FOR APPRAISING THE REAL ESTATE

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KEY WORDS: Real estate, Spatial Infomation Database, Address Matching

ABSTRACT: Up to now real estate appraisers have appraised real estate based on their intuition or experiences. Now that the concern with securitization of real estate is brought to attention, the technique of appraising the real estate more logically, quantitatively and accurately is required. In the course of time several studies have been made on calculating the risk or proper price of real estate by applying usual financial technology to this field. It has been recognized that the price of real estate depends on the micro-level condition. Therefore, investigation not only considering simple geographical elements in what distance estate is located from the main stations of railroad but a spot surveys and appraisals have been important. Now, the spatial information data including various attributes has been arranged so much. Then, in this research, they are collected and it aims at creating the spatial infomation database for performing more rational evaluation of real estate value so much and quickly. After achieving this purpose, there is very big impact in securitization of real estate, etc.

1. INTRODUCTION

In Japan, the price of land continued rising rapidly after the war, and was considered that the price never fall for a long time. However, it plunged suddenly at the first half of the 1990s. It is the so-called collapse of the 'bubble' economy. Till then, the clear basis existed, the price of land was not determined and estimating the risk of real estate was also neglected [that it is negligent]. In recent years, based on teachings of the collapse of the 'bubble' economy, the theory of a financial market is carried into the conventional real estate market, the risk which real estate holds is analyzed, real estate is sold as goods called a security paying attention to the profits which real estate, such as not the profits obtained by dealing of the real estate itself but a house rent, produces, and there is a way motion [1]. That is, "securitization of real estate" -- revision enforcement of the law for SPC in 1998 and the law for REIT in November, 2000 are carried out -- has attracted attention. In response to the flow the technology of performing logically value judgment of real estate which the real estate appraiser has performed by intuition or experience has been needed conventionally.

In such a flow the technique of presenting the risk and reasonable price of real estate by hedonic approach etc. based on the price of real estate reflecting environmental worth has been studied [1]. In this research, it notes using various spatial information databases with which maintenance is recently progressing as a means for identifying the reasonable price of real estate more quantitatively and correctly. As for the spatial information database, maintenance and public presentation are progressing and coming gradually, and a possibility that various information will circulate has swollen. Moreover, it has been made in the place which maintenance of spatial information -- G-XML which describes spatial information in the form of XML of high distributivity is authorized by Japanese Industrial Standards -- reaches. Although that a sufficient number of spatial information databases could not be found has posed a problem in research by old hedonic approach, this may be solvable by using the various map data of an area like a NTT town page or the map data of Zenrin. As for this, the thing for which the price of real estate is estimated more in consideration of not only a local factor but the factor of a micro level like height or sunny became possible.

Based on these situations, by this research, the technology of dropping real estate price information on an electronic map for a housing display etc. automatically at a key, and the technology of collecting and analyzing automatically the circumference situation that a price may be affected, from an electronic map etc. are developed, and it aims at creating a useful spatial information database to real estate price judgment. By these, the real estate price information formed into the present database is used, and index can be developed very efficiently. If the arbitrary points and thing outlines on an electronic map (structure, height, a use, etc.) are put in, the price of the thing can be presumed.

In this paper, first, it explains how the price of real estate attracts attention by real estate securitization, and it explains

how the price is estimated. Based on this, it explains what spatial information database is required in order to estimate the price of real estate. And, it explains what spatial data exists in the present situation, how far database can be made in the present space analysis technique required for real estate judgment, and what technique is required after this,. Finally, a conclusion is described.

2. PRESENT CONDITION OF REAL ESTATE SECURITIZATION

2.1 Debt Type and Equity Type

The security of real estate is roughly divided and has two, a Debt type and an Equity type.
Debt type is a security with which it is published based on the interest payment of the cash flow which a real estate thing induces, or a loan claim, it is stabilized, and interest is paid. Equity type is security which refund is mainly influenced by the net return of a real estate thing, and high-risk high-return. Although these two models are mixed in the case of securitization of real estate, it is common for a Debt type ratio to be large.
In this research, a loan price rather than the sale price of real estate is observed from the above thing.

2.2 Present Appraisal Method of Real Estate Price

Now, judgment of a real estate price is performed by specialist called a real estate appraiser in most. The real estate appraiser has determined the price of a real estate thing using the explanation variable by which a grouping is carried out to following six [2]:

- Location point: city, what on foot-from and station minute etc.
- Building Community Point: seller, appearance, etc.
- Building dwelling-unit point: room arrangement, internal specification, story, sunshine, etc.
- Large-scale point: total number of houses, the selling number of houses
- Time correction point: present day minus selling day
- Selling Trend Item: selling trend

Although the real estate appraisers are identifying using these explanation variables, the appraisal result is not necessarily exhibited and database-ization is not necessarily progressing. Therefore, real estate information has very high opacity, and it is hard to tell price judgment that it is enough shown by the objective basis. It is clear that it is serious evil from a viewpoint of management, updating, and analysis of real estate thing data also to the motion by which real estate securitization is activated.
Since it is such, this research focuss on the spatial information database of a real estate thing, in order to solve this problem. That is, the technology and data which build such a spatial information database easily are offered, and public presentation of the information about a real estate thing progresses by actually building and showing, and the effect that securitization of real estate is promoted is expected.

3. SPARIAL INFORMATION DATABASE FOR REAL ESTATE PRICE JUDGEMENT

3.1 Spatial Information Database Useful to Real Estate Price Judgment

Here, it explains what database is useful as a spatial information database used by price judgment of a real estate thing. Although a real estate appraiser performs price judgment using the explanation variable mentioned by 2.2, if it actually considers what matter a buyer checks in case a real estate thing is purchased, it turns out that the explanation variable which should be added besides the explanation variable mentioned by 2.2 exists. For example, it is also necessary to take into consideration what store and institution exist around the thing. By this research, it considers that surrounding store and institution of a real estate thing are also important for the price of a real estate thing, and it considers including in a spatial information database by it. And it is considered that correlation with a neighboring thing is also what influences a price.
It is necessary to also collect information, such as soil pollution, positively from a rise of the consciousness to an environmental problem in recent years. This is that series information comes to hand from a map at the point concerned at the times, such as a kind of place of business which was carrying out past location, and may be able to be analyzed. And by paying one's attention to more micro conditions, although on the south of a real estate thing was a vacant lot at the time of purchase, when a skyscraper is built, sunshine can take into consideration the risk which decreases remarkably.
This research tries to create these explanation variables as a spatial information database on an electronic map as automatically as possible. And it is necessary to add consideration also about whether it is easy to treat or it is flexible if it is the database of what form.

3.2 Existing Spatial Data

Here, the spatial information data used by this research is explained. In this research, four spatial information data is mainly used. It is four of map data of Zenrin, data of a NTT town page, road network data, and data of real estate things.

Geographical objects in the real worlds, such as a road and a building, are briefly contained in the map data of Zenrin. Data, such as the number of stories, is also contained about the apartment. In this research, in case spatial data is unified, the electronic map of this Zenrin is used as a base.

Stores, such as various stores and a restaurant, are classified into the data of the NTT down page for every type of industry, and those addresses are contained in it as attribute data. About the Japan whole country, the database of the store information on about 11 million is arranged. However, since this data is only data by which it is indicated by the address, it cannot use in integration on other spatial data and an electronic map. Then, in this research, the technique of address matching which gives latitude longitude information on a map from the address is used. The following section explains the technique of address matching.

Road network data is created for car navigation, and in case it can be used in order to acquire the distance along the road to a nearby station and a nearby bus stop etc., and also it takes into consideration place-along-the-route conditions etc., it can be used.

The data of the price of the real estate thing with which dealing and loan were performed is actually due to come to hand with this separately. Since address data is obtained as an attribute, this data is also unified on an electronic map by address matching.

By unifying these four spatial data, it is expected that the spatial information database centering on a real estate thing can be created.

4. CREATION METHODS OF SPATIAL INFORMATION DATABASE

4.1 Address Matching

Here, the technique of creating the spatial information database made into the purpose of this research is discussed using the existing spatial data. In this research, in order to read the data of NTT town page, and the data of a real estate thing with the electronic map of Zenrin, the technique of address matching is used. Address matching is deducing the coordinates value of longitude latitude from the address of a certain geographical objects. In order to display geographical objects to which the address is given with an electronic map, it is necessary to deduce the coordinates value like latitude longitude from the address contained in the attribute of the geographical objects. In this research, address matching service [3] is used for this work. This is service which adds latitude longitude information to the CSV format data file including the address on the Internet, and performs package conversion using the map of Zenrin. It is enabled to read and display geographical objects to which the address is given like Figure 1 with an electronic map by this. In fact, this service is offered in Japanese.

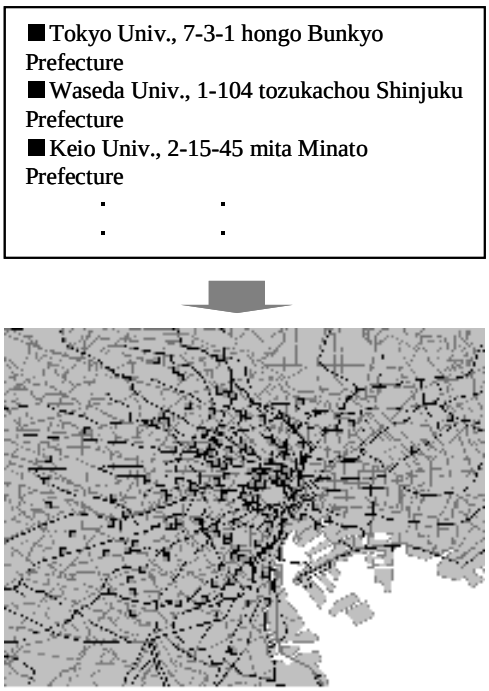

Figure 1. Address Matching

4.2 Other Methods

Next, in order to attain the purpose of this research, it is argued what other technique is required.
In the spatial information database created by this research, as 3.1 described, various spatial information databases are needed. It is necessary not only to drop the existing spatial data on the electronic map by address matching, but to add each explanation variable to this about each real estate thing from there. In order to refer to the correlation of a price with a neighboring thing, between each real estate thing needs to stretch a link.
The technology which creates such a spatial information database automatically about what 10,000 affairs and a certain real estate thing data is needed.

5. CONCLUSION

The following conclusions are obtained by attaining the purpose of this research.

- Creation of a spatial information database useful to price judgment of a real estate thing
- Proposal of the technique of calculating automatically the explanation variable of the more micro level of a real estate thing
- Environment, such as surrounding store, institution, etc. of a real estate thing, is taken into consideration in a real estate price.

It can consider using this spatial information database and performing various analyses as a future view. For example, establishment of the technique of inputting the position of a new real estate thing and calculating the price of the real estate thing automatically using this spatial information database etc.

References

[1] Yuichiro Kawaguchi, 2001. Real Estate Financial Engineering –An Introduction-. Diamond Co., Tokyo.
[2] Yasuhisa Ishihara, 2000. The market price analyzing method by presumption and data mining of an apartment price determination factor based on an amount of information standard. Master Thesis, Tokyo Institute of Technology.
[3] CSV Geocoding Service, http://fujieda.csis.u-tokyo.ac.jp/cgi-bin/geocode.cgi .